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ABSTRACT

The Southern Regional Education Board (SREB) is currently implementing two comprehensive school reform initiatives, Making Middle Grades Work (MMGW) and Making Schools Work (MSW). The purpose of both initiatives is to raise student achievement, and they both rest on the belief that all students can complete a rigorous program of studies at middle grades and high school levels that will improve their postsecondary educational and career opportunities. MSW and MMGW involve a framework of key practices for schools to use to accelerate student achievement. Among these key practices is the need for schools to provide effective guidance and advisement for all students with the intent that teachers, principals, and parents will communicate high expectations for all students. This paper covers two components of guidance and advisement: the communication of high expectations through goal setting and planning, and encouragement from school staff to do well in school. The purpose of this paper is to explore the relationship between the actions of school staff, such as encouragement and guidance, and the academic choices that students make. This paper studies two practices that school staff can follow to influence the academic choices that students make: (1) the extent to which guidance counselors and teachers provide assistance to students in planning their high school program and (2) the extent to which guidance counselors and teachers encourage students regarding their academic achievement. Two appendixes present study data. (Contains 46 references, 6 tables, and 2 figures.) (GCP)

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Influence of School Practices on Students' Academic Choices

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Influence of School Practices on Students' Academic Choices

Introduction

The Southern Regional Education Board (SREB) is currently implementing two comprehensive school reform initiatives. The first, Making Middle Grades Work (MMGW) (SREB, 2000a), involves working with middle grade schools in both rural and urban areas. The second, Making Schools Work (MSW) involves working with clusters of high schools and their feeder middle grades schools in rural areas (SREB, n.d.). The purpose of both initiatives is to raise student achievement, and they both rest on the belief that all students can complete a rigorous program of studies at middle grades and high school levels that will improve their postsecondary educational and career opportunities. MSW and MMGW involve a framework of key practices for schools to use to accelerate student achievement. Among these key practices is the need for schools to provide effective guidance and advisement for all students with the intent that teachers, principals, and parents will communicate high expectations for all students. Research has shown that, compared to students at schools with low levels of guidance, students at schools with high levels of guidance rate their schools more highly in terms of preparing them for a job and for continuing their education (Nelson, Fox, & Gardner, 1998).

This paper covers two components of guidance and advisement: the communication of high expectations through goal setting and planning, and encouragement from school staff[1] to do well in school. Students should work with guidance counselors and teachers at their school to create an education and career plan that covers 6 years—4 years of high school and 2 years beyond high school (SREB, n.d.). Teachers and counselors should communicate high expectations to students in various ways, including encouraging students to do well in school and take challenging academic courses and providing opportunities for students to get extra help to perform well in those courses.

In both middle grades and high school, students can make various choices that influence their educational outcomes. For example, in middle grades students choose how hard to work in school, which influences their grades. In high school, students choose which courses they take, which influences their educational and occupational options after high school. The purpose of

[1] Throughout this paper the term "school staff" refers to guidance counselors and teachers.

this paper is to explore the relationship between the actions of school staff, such as encouragement and guidance, and the academic choices that students make.

This paper studies two practices that school staff can follow to influence the academic choices that students make: (1) the extent to which guidance counselors and teachers provide assistance to students in planning their high school program and (2) the extent to which guidance counselors and teachers encourage students regarding their academic achievement. Because middle grades students have fewer choices compared to high school students regarding the academic courses they will take, the outcome variables for this study differ for middle grades and high school students; however, the outcomes for both groups represent student behavior linked to successful educational careers.

In the middle grades, where students have little choice about the courses they take, we examined how frequently students try to do their best in school and how frequently students complete their assignments. In high school, where students have more influence over the courses they take, we examined the number of college-preparatory mathematics and science courses that students take. Figures 1 and 2 display the theoretical models that these analyses are based on.

Figure 1. Theoretical Model for Predicting Middle Grades Academic Choices

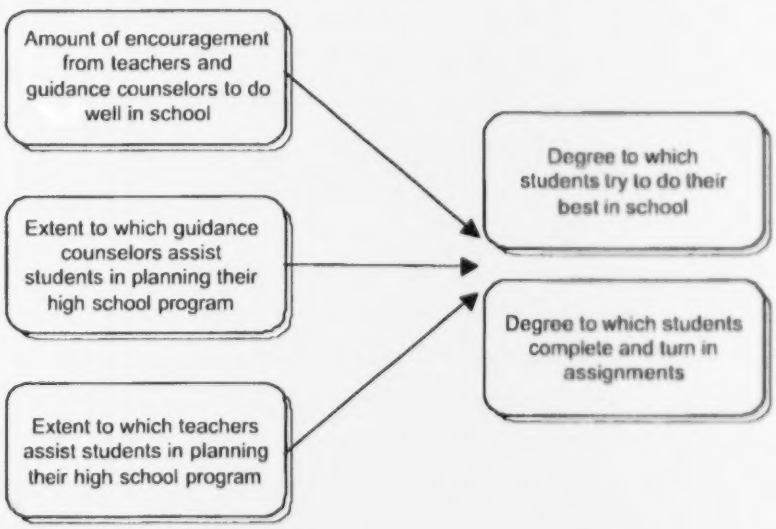
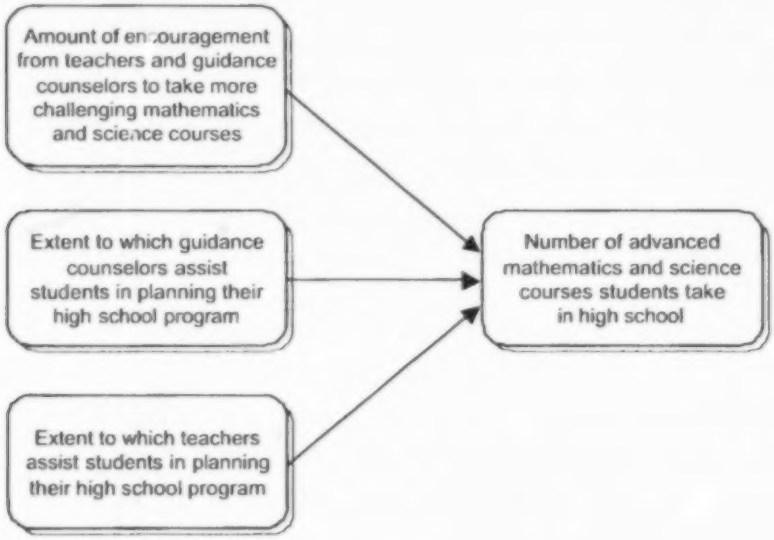

Amount of encouragement from teachers and guidance counselors to do well in school
Extent to which guidance counselors assist students in planning their high school program
Extent to which teachers assist students in planning their high school program
Degree to which students try to do their best in school
Degree to which students complete and turn in assignments

Figure 2. Theoretical Model for Predicting High School Coursetaking


Amount of encouragement from teachers and guidance counselors to take more challenging mathematics and science courses
Extent to which guidance counselors assist students in planning their high school program
Extent to which teachers assist students in planning their high school program
Number of advanced mathematics and science courses students take in high school

Middle Grades

The middle grades are a crossroads for adolescents in terms of both academic achievement and personal development. In early adolescence most students have high educational aspirations. Sixty-nine percent of eighth graders report that they intend to graduate from college. Another 11% plan to complete graduate school (SREB, 2000b). Despite the high aspirations of students, many schools continue to allow students to enter high school with skills that do not match their aspirations. In fact, the majority of high school teachers who teach ninth graders report that only 40% or fewer of students enter ninth grade prepared to be successful in college preparatory courses: 41% of teachers report that fewer than 20% of ninth graders are prepared, and 34% of teachers report that between 21% and 40% of ninth graders are prepared (Making Schools Work, 2001).

Guidance during the middle school years can help align students' aspirations and academic skills. Successful middle schools provide structured advisement time, during which students can explore career and educational options and learn other important skills for success in challenging high school and college courses (Ayres, 1994; Herring, 1998; Lapan, Gysbers, & Petroski, 2001; Lee, 1993; National Middle Schools Association [NMSA], 1996; Putbrese,

1989). In these schools, counselors and teachers serve as extended contacts for students, monitor their progress, and direct them to the help they need as quickly as possible.

The type of planning or anticipatory behavior that students learn through guidance programs has been noted among children who succeed in school. Successful students have short-term plans (e.g., next week, next summer) as well as plans for the future (Clark, 1983). Middle schools can help students build their capacities for planning by guiding them through a series of career and academic planning activities. Career exploration activities designed to build self-knowledge relating to career interests and aptitudes compliment a strong academic program (National Career Development Association [NCDA], 1993). This exposure is particularly important in the eighth grade, when students are planning their high school course of study (Herring, 1998), but the planning should build upon and reinforce prior experiences in the sixth and seventh grades.

Lapan et al. (2001) conducted a survey of middle school teachers and seventh-grade students in Missouri. After controlling for differences in school size and socioeconomic status, they found that in schools where teachers rated guidance programs as more fully implemented, students reported higher overall satisfaction with school (e.g., more positive relationships with teachers, felt school was relevant to them, felt safer at school) and had higher grade point averages.

When guidance programs connect each student in the building with a caring adult, schools can promote the close student-teacher relationships critical to student success in the middle grades (Ayres, 1994; Murdock, 1999; NMSA, 1996; Putbrese, 1989; Wentzel, 1999). These relationships have a positive effect on the goals that students set for themselves, and goals are powerful motivators of behavior, whether they be socially oriented (e.g., to gain approval from others or establish personal relationships with teachers) or task-oriented (e.g., to meet standards for achievement or master academic content) (Wentzel). For example, when comparing three aspects of the motivational context within a school—teacher support, peer support and students' economic opportunity structure—seventh grade students' perceptions of teachers' academic support and long-term expectations for them were the greatest and most consistent predictor of behavior (Murdock).

Students develop fewer maladaptive motivational beliefs toward school when their educational environment conveys positive information regarding the value of schooling and their

probability of success. Close student-teacher relationships are a critical component of this environment, also called a motivational context, and were found to partially mediate the relationship between status indicators of potential risk and alienation from school (Murdock, 1999). For example, students' motivation to learn increases when they view teachers as personally interested in them (Ziegler & Mulhall, 1994) and are held to challenging expectations (Murdock). Students who develop this sense of relatedness with teachers and view their classrooms as supportive environments are also more likely to pursue the goals valued by their teachers, including task-related goals to learn and achieve (Wentzel, 1999). In addition, effort in the classroom, student progress, and goal commitment increase when students experience recognition of their goals (Mac Iver, 1992). By linking each student in the building with a caring advisor, schools establish a safety net that helps to ensure that students have at least one adult they feel close to and who provides some of the recognition for their efforts, which is seen as critical to their success.

In this era of standards-based reform, guidance and counseling remain, for the most part, unmapped and uncharted. For example, research in this area reflects the transitory nature of the definition of guidance in the middle grades and the overlap in terminology used to describe guidance, counseling, and career development from study to study (Maddy-Bernstein, 2000). According to Gysbers (2000), most schools have no organized structure to support expectations for guidance. Studies provide piecemeal support for common guidance program objectives, but few formal or comprehensive research studies address their overall effectiveness (NMSA, 1996). While it is hard to measure what you cannot define, several states are implementing guidance curricula upon which future research may be based. However, at this time, few studies report on guidance programs focused upon both goal setting and planning and encouragement from teachers.

Summary

In this section of the paper we explored the extent to which the amount of guidance and encouragement that eighth graders receive influences both the effort they put forth and whether they complete and turn in their school assignments. Two hypotheses are tested in the next section of the paper. The first is that middle grades students who receive more guidance and encouragement from school staff will be more likely to try to do their best in school. The second

is that middle grades students who receive more guidance and encouragement from school staff will be more likely to complete and turn in their assignments.

Methods—Middle Grades

Sample Description

Data for this study were collected as part of the MSW and MMGW school reform initiatives. Sixty-one middle grades schools in 14 states (Arkansas, Alabama, Delaware, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Ohio, South Carolina, Tennessee, Virginia, and West Virginia) distributed surveys and a reading assessment to 4,843 students (52% female) during the spring of their eighth grade year (school year 1999–2000). Sixty-eight percent of the students were White, 25% were African-American, and the remaining 7% were American Indian, Asian, Latino/Hispanic, or Native Hawaiian/Pacific Islander.

Measures

We included several control variables in the analyses that have been found by prior research to have an impact on educational outcomes. Control variables included mother's education,[2] ethnicity, gender, reading ability (as measured by performance on the MMGW NAEP-like Middle Grades Assessment), and the extent to which students talked with their parents about planning their school program (parental guidance).

Our independent variables were the extent to which students talked with teachers about planning their school program (guidance from teachers), the extent to which students talked with guidance counselors about planning their school program (guidance from guidance counselors), and the amount of encouragement students received from teachers. Table 1 presents a description of the variables.

Our outcome variables were the frequency with which students tried to do their best work in school and the degree to which students completed and turned in their assignments (see Appendix A for the zero-order correlations of the variables).[3]

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[2] Students reported their mother's education level using the following choices: "did not finish high school," "graduated from high school," "had some education after high school," "graduated from college," or "I don't know." Students who answered "I don't know" were coded as having missing data.

[3] The data reported in the tables come from only those students whose data were complete enough to be included in either the mathematics or the science regressions. The correlations for student effort in Appendix A represent only the data from students included in Model 1, and the correlations for student assignments in Appendix A represent only the data from students included in Model 2.

Table 1. Middle Grade Variable Descriptions

Amount of Guidance a Student Received		
"How often have you talked with the following people about what classes you will take in high school?"		
Mother or stepmother	Not at all	16%
	Several times	50%
	A great deal	35%
Father or stepfather	Not at all	41%
	Several times	45%
	A great deal	15%
A guidance counselor	Not at all	64%
	Several times	30%
	A great deal	6%
Teachers	Not at all	48%
	Several times	45%
	A great deal	8%
Encouragement from School Staff		
"My teachers encourage me to do well in school."		
	Never	93 (2%)
	Rarely	323 (8%)
	Sometimes	852 (21%)
	Often	2801 (69%)
Student Effort		
"How often did you try to do your best work in school?"		
	Never	55 (1%)
	Rarely	643 (16%)
	Sometimes	1344 (33%)
	Often	2027 (50%)
Student Achievement-Related Decisions		
"How often did you fail to complete or turn in your assignments?"		
	Never	2029 (50%)
	Rarely	1640 (40%)
	Sometimes	338 (8%)
	Often	62 (2%)

Results—Middle Grades

Plan of Analysis

We addressed the research questions using hierarchical multiple regression analyses to assess the net relationships between the guidance and encouragement variables with the student effort variables. In the regression analyses, we entered the variables in two blocks. In the first block we entered the group of control variables; in the second block we entered the school staff guidance and encouragement variables.

Amount of Student Effort

As can been seen in Table 1, 50% of students reported that they often try to do their best in school. Half (50%) of all students reported that they never fail to complete or turn in their assignments.

Model 1: Predicting Student Responses to the Item Dealing with Effort

Table 2 presents the results of the multiple regression analyses to assess the net relationships between the guidance and encouragement variables with the student effort and homework completion variables. The first block of variables (the control variables) predicted 9% of the variance in student responses (R^2 = .09). Higher reading ability, being female, and more frequent parental guidance were positive predictors of student effort. Being White was a negative predictor of student effort. The second block of variables, consisting of encouragement from teachers and guidance from teachers and guidance counselors, explained an additional 4% of the variance (R^2 = .04). Both guidance and encouragement from teachers were positive predictors of student effort, and the change in amount of variance was significant (F (4,078) = 55.65***).

Model 2: Predicting Student Responses to the Homework Completion Item

Table 2 also presents the results of the second set of regression analyses. The control variables entered in block 1 explained 11% of the variance in how frequently students complete and turn in assignments (R^2 = .11). Higher maternal education, being female, higher reading ability, and more frequent parental guidance were positive predictors. The second block of variables, consisting of encouragement from teachers, guidance from teachers, and guidance from guidance counselors, explained an additional 1% of the variance (R^2 = .01).[4] Once again, both encouragement and guidance from teachers were positive predictors. The change in the amount of variance explained is significant (F (3,4070) = 14.04***).

[4] Due to rounding; the total R^2 is still .11 even after the additional 1% of variance explained by Block is added. Although the increase is very small, it is statistically significant.

Table 2. Standardized Regression Coefficients for the Effect of Encouragement and Guidance from Teachers on the Frequency with Which Students Report Trying Their Best Work at School and Completing and Turning in Their Assignments

	Model 1 – Try to do my best in school		Model 2 – Complete or turn in assignments often	
Independent variables	**Standardized path coefficients of final model**	**Total R^2**	**Standardized path coefficients of final model**	**Total R^2**
Block 1: Control Variables		.09***		.11***
Mothers education	.00 (.00)		.06 (.04)***	
White (0=no, 1=yes)	.11 (.19)***		.01 (.01)	
Gender	.11 (.18)***		.09 (.12)***	
Reading ability	.09 (.00)***		.21 (.00)***	
Guidance from mother	.13 (.15)***		.07 (.07)***	
Guidance from father	.04 (.04)*		.07 (.07)***	
Block 2: School Characteristics		.13***		.11***
Teacher encouragement to do well in school	.16 (.17)***		.05 (.05)***	
Amount of guidance from teachers	.10 (.12)***		.08 (.09)***	
Amount of guidance from guidance counselors	.02 (.02)		.03 (.03)	

Try to do my best work in school: $n = 4,088$
Complete or turn in your assignments: $n = 4,080$
Unstandardized coefficients in parentheses.
* $p < .05$, *** $p < .001$

Discussion—Middle Grades

The results of this study help support the hypothesis that guidance and encouragement from teachers play a critical role in middle grades students' selection of strategies for academic success, such as trying their best and completing and turning in assignments. These findings correspond with previous research demonstrating the importance of both positive student-teacher relationships in increasing student motivation to learn (Ayres, 1994; Murdock, 1999; NMSA, 1996; Putbrese, 1989; Wentzel, 1999) and the role of teachers in providing guidance to students (Ayres). The results of this study do not indicate that guidance from counselors has a significant effect upon either behavior selected for analysis. This may be the result of limited student access to counselors on a one-to-one basis to discuss high school plans. Counselors traditionally see

students for problem-based referrals (by teachers, parents, administrators, or themselves) or work with students in group settings (S. Cooney, personal communication, October 15, 2001).

Guidance and encouragement from teachers were statistically significant predictors of how frequently students completed their assignments. However, the practical significance of these results should be interpreted with caution. The amount of variance attributable to guidance and encouragement from teachers was small ($R^2 = .01$) but statistically significant ($p < .001$). This may be a consequence of the large sample (n= 4,080) because the likelihood of obtaining a significant regression coefficient increases with sample size (Lewis-Beck, 1980).

Having a better reading ability, being female, and getting more frequent guidance from parents were positive predictors of student effort and completion of assignments. This finding complements previous work indicating that female students outperform their male counterparts in reading (Donahue, Voelkl, Campbell, & Mazzeo, 1999). However, the effects of other control variables differed according to the outcome variable selected for analysis. Students' race/ethnicity related significantly to student effort but not to the completion of assignments, while higher maternal education was significantly related to completing assignments but not to student effort.

The current study could have been improved if survey items had been available that related specifically to the courses students planned to take in high school and whether they had a written plan of study for high school. In addition, survey items relating to the content of guidance experiences, rather than the frequency with which students interacted with counselors and teachers for the purpose of guidance, would also help create a more complete picture of middle grades guidance for comparison with student achievement-related behaviors. Furthermore, a longitudinal design, in which follow-up surveys are administered to the same group of students as 10th graders, would allow for more specific results (e.g., do students who report receiving more guidance from either teachers or counselors in the middle grades take more challenging academic courses in high school?). Longitudinal data would also allow us to examine the relationship between participation in middle grades guidance programs and both the number of advanced courses students take in high school and the grades earned in high school courses.

The results of the current study may also have been biased by the criteria used by states to select schools for the MSW and MMGW improvement initiatives. The criteria varied from

state to state, and in some states, schools may have been more likely to have been selected if they needed to make significant improvements in student achievement.

The success of guidance programs hinges upon administrator commitment and teacher involvement. Administrators can provide time for counselors and teachers to plan guidance activities (Ziegler & Mulhall, 1994) and help ensure that teachers feel comfortable with the role of advisor by providing adequate preparation (e.g., professional development outlining the roles and expectations of advisors and the characteristics and needs of young adolescents) (Ayres, 1994; Ziegler & Mulhall).

Increased effort and completion of assignments are characteristics of successful students, and this study supports previous findings that guidance and encouragement from teachers contribute to student success. Yet guidance programs vary greatly from school to school and state to state, and very few have been linked to increased student performance. In this era of high-stakes testing, the lack of research may contribute to the tendency of administrators to de-emphasize guidance and advisement as compared to programs promising to improve student performance in reading or mathematics. It may also indicate that access to comprehensive programs is limited (Epstein & Mac Iver, 1992). Guidance alone cannot improve student performance, but as the research outlined in this paper suggests, guidance and support for students do contribute to increased student effort.

High School

In this section of the paper we study two specific practices that school staff can take to influence the number of college-preparatory mathematics and science courses that high school students complete: (1) the extent to which guidance counselors and teachers provide assistance to students in planning their high school program and (2) the extent to which guidance counselors and teachers encourage students to take more challenging mathematics and science classes.

We begin our study of this topic by reviewing the literature on the importance of taking college-preparatory mathematics and science courses, the amount of guidance and encouragement that students currently receive, and the relationship between guidance and encouragement from school staff and student coursetaking.

The Importance of Taking Advanced Mathematics and Science Courses

Taking rigorous mathematics and science courses during high school influences students' achievement levels, admission to colleges and other postsecondary educational institutions, and

entry into mathematics- and science-related careers. Research has shown that taking more mathematics and science courses, and especially advanced mathematics and science courses, raises achievement in those areas (Gamoran, 1987; Lee & Bryk, 1988; Lee, Burkam, Chow-Hoy, Smerdon, & Geverdt, 1998; Ma, 2000; Walberg, Fraser, & Welch, 1986). For example, Gamoran found that for both mathematics and science, the number of courses taken in each subject area influences students' achievement test scores in that subject area, and the number of advanced courses taken in each subject is an even stronger predictor of achievement. Lee et al. also found that students who took more advanced mathematics courses had higher mathematics achievement scores at the end of high school.

Taking mathematics and science courses in high school is also related to college enrollment. State universities and colleges and other educational organizations recommend that college-bound students take 3 or 4 years of mathematics and 2 or 3 years of laboratory science (ACT, Inc., 2001; National Commission on Excellence in Education, 1983; Riley, 1997; U.S. Department of Education, 1997). The amount and difficulty of mathematics and science courses taken in high school predict college enrollment (Csikszentmihalyi & Schneider, 2000). In 1997, for example, 68% of students who entered 4-year colleges and universities had completed 4 years of mathematics in high school (Riley). Horn and Nuñez (2000) found that a greater percentage of students who completed advanced mathematics courses in high school enrolled in a 4-year college compared to those who did not complete advanced mathematics courses. We cannot conclude causality here, since it is likely that other factors related to both of these outcomes are at play, such as the likelihood that students who determine early on that they want to go to college are more likely to both take rigorous courses and enroll in college than other students. However, we can hypothesize that the relationship between the desire to attend college and admission to college is mediated by having taken rigorous high school courses.

Among students who go to college after high school, the sequence of mathematics and science courses that a student takes in high school is the best predictor of whether a student goes to a 4-year college or a 2-year college (Csikszentmihalyi & Schneider, 2000). In addition, students who completed advanced science (chemistry and physics) courses in high school were more likely to attend very selective colleges compared with students who took average science courses (Csikszentmihalyi & Schneider). The distinction between going to a 2-year versus a 4-year college is an important one because although almost 70% of students attending a 2-year

college plan to transfer to a 4-year college and earn a bachelor's degree, many do not achieve that goal (Schneider & Stevenson, 1999). Compared to students who initially enroll in a 4-year college, students who initially enroll in a 2-year institution are 28% less likely to earn a bachelor's degree within 4 years (Schneider & Stevenson).

Another reason students should take advanced mathematics and science courses in high school is that these courses are necessary for entry into college majors and occupations in mathematics- and science-related fields (Horn & Nuñez, 2000; Lee et al., 1998; Oakes, 1990; Riley, 1997; Sells, 1978). Sells argued that students who do not take 4 years of college-preparatory high school mathematics and science classes may become victims of the "mathematics filter," whereby they get filtered out of the sequential pipeline of courses that students must take in order to be qualified to enter postsecondary studies in mathematics and science. These students enter college without having completed the background coursework necessary to take the freshman calculus sequence recommended or required for many mathematics- and science-related majors.

Thus, curricular choices that students make early on in high school have powerful consequences for their educational and occupational options during and after high school (Leitman, Binns, & Unni, 1995; Oakes, 1990; Schneider & Stevenson, 1999; Stevenson, Schiller, & Schneider, 1994). The number of advanced mathematics and science courses that students take can influence their achievement scores, entry into a 4-year versus a 2-year college, and entry into mathematics- and science-related majors and occupations.

How Much Guidance and Encouragement Are Students Getting?

Research has shown that many students do not receive much guidance when choosing their courses. Leitman et al. (1995) found that among 5th through 11th grade students who made decisions about which math courses to take, only one-third were advised by their math teachers, and only one-fourth were advised by a guidance counselor. Lee & Ekstrom (1987) found that only about 50% of high school sophomores had spoken with a guidance counselor about planning their school program. Horn & Nuñez (2000) found that in the eighth grade, only 38% of students had talked to a teacher or counselor about taking algebra and that few students had spoken with teachers (16%) or counselors (16%) three times or more about their high school program. Leitman et al. did find that among nonminority students a majority of 9th through 11th

graders (two-thirds) had been encouraged by teachers to take more advanced mathematics and science classes, but this was only true for one-half of minority students.

Previous Research on the Relationship Between Guidance/Encouragement and Student Coursetaking

Empirical research that directly examines the relationship between guidance or encouragement from school staff and student coursetaking is limited to a few studies. Lantz and Smith (1981) found that a student's perception of others' (parents', teachers', counselors', and peers') opinions concerning mathematics is one of the main factors that influences the decision to enroll in nonrequired mathematics courses, but they did not separate out teacher and counselor opinions as individual predictors. For African-American students, talking with a counselor was one of the strongest predictors of enrollment in eighth grade algebra (Singh & Granville, 1998). Lee and Ekstrom (1987) found an indirect relationship between guidance and coursetaking. Nelson et al. (1998) found that students in schools with higher levels of guidance were somewhat more likely to take advanced mathematics and science courses compared with other students.

Summary

In this section of the paper, we explored the importance of taking math and science classes, the amount of guidance students receive, and previous research on the relationship between the two. Two hypotheses are tested in the next section of the paper. The first is that students who meet more frequently with school staff to plan their high school program will choose to take more mathematics and science courses. The second is that students who receive more encouragement from school staff to take more challenging mathematics and science courses will do so.

Methods—High School

Sample Description

Data for this study were collected as part of the MSW school reform initiative. Rural schools distributed surveys to 991 students (54% female) in seven states (Arkansas, Ohio, Kentucky, Maryland, North Carolina, Tennessee, and West Virginia) during the spring of their senior year (school year 1999–2000). Seventy-six percent of the participants were White, 18%

were African-American, 5% were American Indian or Alaska Native, and 1% were Latino/Hispanic.[5]

Measures

We included several control variables in the analyses that have been found by prior research to have an impact on student coursetaking patterns. Control variables included parental education,[6] the extent to which students talked with their parents about planning their school program (parental guidance), how far students were on the math course sequence when they entered high school (whether they had taken Algebra 1 at any time in sixth through eighth grades), school graduation requirements in mathematics and science, gender, and ethnicity.

Our independent variables were the amount of encouragement students received from school staff to take more challenging mathematics and science courses, the extent to which students talked to teachers about planning their school program (guidance from teachers), and the extent to which students talked with guidance counselors about planning their school program (guidance from guidance counselors). Table 3 presents a description of the variables.

Our outcome variables were the number of college-preparatory courses that students took in mathematics and science. With assistance from school staff, students used a copy of their transcripts to fill out survey questions on which courses they took.[7,8] Table 4 presents a list of the college-preparatory courses (see Appendix A for the zero-order correlations of the variables).

Results—High School

Plan of Analysis

We addressed the research questions using hierarchical multiple regression analyses to assess the net relationships between the guidance and encouragement variables with the coursetaking variables. In the regression analyses, we entered the variables into two blocks. In

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[5] Eleven percent of the original sample did not have a complete set of data and are not included in further analyses.

[6] We used the highest education level of either parent in the family as reported by the student as our measure of parental education. For each parent, students reported their parent's education level, using the following choices: "did not finish high school," "graduated from high school," "had some education after high school," "graduated from college," or "I don't know." Students who answered "I don't know" for both parents were coded as having missing data on the parental education variable.

[7] In order to maintain the integrity of the data, we did not use the data of 18 students whose reports of the number of credits that they took are implausible (students who reported having more than 11 credits each in mathematics, science, or English) (S. Cooney, personal communication, December 17, 2001).

[8] The data reported in the tables comes from only those students whose data were complete enough to be included in either the mathematics or the science regressions. The correlations for mathematics in Appendix A represent only the data from students included in the mathematics model, and the correlations for science in Appendix A represent only the data from students included in the science model.

the first block we entered the group of control variables; in the second block we entered the school staff guidance and encouragement variables.

Table 3. High School Variable Descriptions

Guidance in Planning Student's School Program		
"How much have you talked with the following people about planning your school program?"		
Mother or stepmother	Not at all	9%
	Somewhat	36%
	A great deal	55%
Father or stepfather	Not at all	27%
	Somewhat	43%
	A great deal	30%
A guidance counselor	Not at all	19%
	Somewhat	58%
	A great deal	23%
Teachers	Not at all	26%
	Somewhat	60%
	A great deal	15%
Encouragement from Teachers and Counselors to Take More Challenging Mathematics Courses		
"I was encouraged by counselors and teachers to take more challenging mathematics courses"		
	Never	29%
	Seldom	21%
	Sometimes	26%
	Often	24%
Encouragement from Teachers and Counselors to Take More Challenging Science Courses		
"I was encouraged by counselors and teachers to take more challenging science courses"		
	Never	35%
	Seldom	23%
	Sometimes	24%
	Often	18%
Took Algebra 1 in Middle Grades		
	Yes	47%
Number of Mathematics Credits Required for Graduation		
	Average = 3.10 Carnegie units, range = 2 to 4	
Number of Science Credits Required for Graduation		
	Average = 2.84 Carnegie units, range = 1 to 4	
College-Preparatory Mathematics Credits Earned		
	Average = 2.92 Carnegie units, range = 0 to 7	
College-Preparatory Science Credits Earned		
	Average = 2.28 Carnegie units, range = 0 to 8	

Table 4. College-Preparatory Mathematics and Science Courses

Mathematics
Regular, Advanced, or College Prep Algebra 1
Algebra 2
Geometry; Trigonometry or Algebra 3
Pre-calculus, Calculus, or Advanced Placement Mathematics
Mathematics Analysis or Advanced Mathematics
Integrated Mathematics
Science
Advanced, Academic, College Prep, or Honors Biology
Advanced Placement Biology or Biology 2
Anatomy or Physiology
Chemistry
Physics
First-Year Principles of Technology (Applied Physics)
Second-Year Principles of Technology (Applied Physics)
Applied Biology-Chemistry
Integrated Science

Amount of Guidance and Encouragement that Students Currently Receive from School Staff

As can been seen in Table 3, many of the students in this study reported that they had spoken with a guidance counselor or their teachers "somewhat" about planning their school program. A cross-tabular analysis of guidance from teachers and from guidance counselors (see Table 5) shows that 10% of students had not spoken with teachers or guidance counselors about their school program and that only 30% had spoken a great deal about their school program with teachers, guidance counselors, or both (the total percentages of "A great deal" row and column).

Table 5. Extent to Which Students Plan School Program with Guidance Counselors or Teachers

Plan School Program with Guidance Counselors	**Plan School Program with Teachers**		
	Not at all	Somewhat	A great deal
Not at all	10%	8%	1%
Somewhat	14%	38%	6%
A great deal	2%	13%	8%

Table 3 shows that only 50% of students were sometimes or often encouraged by school staff to take more challenging mathematics courses, and only 42% of students were sometimes or often encouraged by school staff to take more challenging science courses.

Predicting the Number of College-Preparatory Mathematics Courses Taken

Table 6 presents the results of the multiple regression analyses predicting the number of college-preparatory mathematics courses that students took. As mentioned above, we first entered the control variables (Block 1); thus the R^2 associated with Block 1 (.20) represents that control variables explained 20% of the variance in the number of college-preparatory mathematics courses taken. These analyses show that having parents with higher levels of education, taking Algebra 1 in the middle grades, being female, and having a higher number of mathematics courses required for high school graduation were all significant positive predictors of the number of college-preparatory mathematics courses that students took. There was also a trend that being White was a positive predictor of the number of college-preparatory mathematics courses that students took. Adding the effects of encouragement and guidance from school staff into the model (Block 2) explained an additional 6% of the variance in the number of college-preparatory courses taken. The change in the amount of variance explained is significant ($F(3,868) = 22.71^{***}$), showing that the amount of encouragement students received from school staff to take more challenging mathematics courses and the amount of guidance students received from guidance counselors about planning their high school programs had a significant impact on the number of college-preparatory mathematics courses that students took.

Predicting the Number of College-Preparatory Science Courses Taken

Table 6 also presents the results of the multiple regression analyses predicting the number of college-preparatory science courses taken. As above, we first entered the control variables (Block 1); thus the R^2 associated with Block 1 (.17) represents that the control variables explained 17% of the variance in the number of college-preparatory science courses taken. As in the mathematics model, these analyses show that having parents with higher levels of education, taking Algebra 1 in middle school, being female, and having a higher number of science courses required for graduation were all significant positive predictors of the number of college - preparatory science courses that students took. Adding the effects of encouragement and guidance from school staff into the model (Block 2) explained an additional 3% of the variance

Table 6. Standardized Regression Coefficients for the Effect of Encouragement and Guidance from School Staff on the Number of College-Preparatory Mathematics and Science Courses Taken

Independent variables	Model 1—Mathematics		Model 2—Science	
	Standardized path coefficients of final model	Total R^2	Standardized path coefficients of final model	Total R^2
Block 1: Control Variables		.20***		.17***
Parent education	.20 (.30)***		.12 (.17)***	
Took algebra 1 in middle grades (0 = no, 1 = yes)	.23 (.71)***		.16 (.47)***	
Female (0 = no, 1 = yes)	.11 (.35)***		.09 (.26)**	
White (0 = no, 1 = yes)	.05 (.19)†		.05 (.15)	
Amount of guidance from mother	.00 (.00)		.03 (.07)	
Amount of guidance from father	.04 (.09)		.01 (.02)	
Number of mathematics (science) courses required for graduation	.18 (.73)***		.27 (.69)***	
Block 2: School Characteristics		.26***		.20***
Amount of encouragement from school staff to take challenging mathematics (science) courses	.20 (.27)***		.16 (.21)***	
Amount of guidance from teachers	.02 (.04)		.02 (.05)	
Amount of guidance from guidance counselors	.10 (.23)**		.06 (.14)†	

Mathematics: $n = 879$, Science: $n = 876$.
Unstandardized coefficients in parentheses.
† $p < .10$, ** $p < .01$, *** $p < .001$.

in the number of college-preparatory courses taken. The change in the amount of variance explained is significant (F (3,865) = 13.44***), showing that the amount of encouragement a student received at school to take more challenging science courses had a significant impact on the number of college-preparatory science courses that students took. There was also a trend that the amount of guidance that students received from a guidance counselor was a significant positive predictor of the number of college-preparatory science courses that students took.

Discussion of the Results—High School

In sum, the analyses support the hypothesis that students who receive more encouragement and guidance to take advanced courses from school staff do so. In mathematics, students who received more encouragement from school staff to take more advanced courses and those who received more guidance from a guidance counselor took more college-preparatory mathematics courses. In science, students who received more encouragement from school staff to take more advanced courses took more college-preparatory science courses, and there was a trend that students who received more guidance from a guidance counselor took more college-preparatory science courses. There was no relationship between the amount of guidance that students received from teachers and the number of college-preparatory courses they took in either subject area.

The finding that encouragement from counselors and teachers was a stronger predictor than the extent to which students planned their high school program with them leads us to consider two issues. The first is that encouragement from school staff to take more challenging mathematics and science courses may occur in the context of students' planning their high school programs with school staff. Thus, some of the predictive power of the amount of guidance a student receives from teachers or guidance counselors may be incorporated into the predictive power of the encouragement that one gets from school staff to take challenging courses. To the degree that this is the case, the variables measuring the amount of guidance students receives from school staff will be a weaker predictor in the model. This phenomenon seems to come into play with receiving guidance from a guidance counselor. In the math model, when the encouragement variable was taken out of the model, the amount of guidance from a guidance counselor became a stronger predictor (the predictive power of the amount of guidance from a teacher did not change; see Appendix B). In the science model, when the encouragement variable was taken out of the model, the amount of guidance from a guidance counselor became a significant predictor, and a trend appeared for the amount of guidance from teachers (see Appendix B).

Second, these differences in predictive power may indicate the importance of measuring the content of the interaction between students and school staff. Asking students only about the extent to which they speak with school counselors about planning their school program as a measure of the guidance they receive does not address the content of those interactions.

Alternatively, asking students whether they have been encouraged to take more challenging courses specifies the content of the interaction and indicates that it was likely a positive interaction. The extent to which students plan their school programs with school counselors may be a stronger predictor when the content of those interactions is measured. Thus, we may conclude that both encouragement to take more courses and planning one's program with a guidance counselor are predictors of coursetaking (although the second variable was a trend for science courses), but we should take care in drawing conclusions about the relative strength of these predictors due to the limited information we have about students' interaction with guidance counselors while planning their school programs.

Although receiving guidance from guidance counselors was a significant predictor of the college-preparatory mathematics courses that students took, receiving guidance from teachers was not. One explanation is discussed above: we do not know the content of these discussions, so it is difficult to interpret this finding. Guidance from teachers could include such disparate topics as encouraging students to take more college-preparatory courses or telling students that they do not have the prerequisites needed to take certain college-preparatory courses. Thus, this relationship should be further studied with variables that measure the content of students' guidance from teachers. Another possible explanation is that interactions with teachers may be more casual, while interactions with guidance counselors may be more formal. Sitting down with a guidance counselor at an appointed time to plan one's school program may be more influential on the courses one takes than casual conversations with teachers. However, we do not know whether it is the nature and context of the interaction or the person with whom the students discuss their school programs that drives the difference in the power of predictability in these models. We need more information regarding students' interactions with teachers when discussing their school programs. Again, because we do not know the content or the level of formality of these discussions, it is difficult to interpret this finding.

What are the mechanisms though which encouragement and guidance from counselors and teachers might influence students' coursetaking patterns? Lee and Ekstrom (1987) found an indirect link through curriculum track placement. They found support for the hypothesis that students who planned their program with a guidance counselor were more likely to be placed on the academic track and as a result of this placement were more likely to take advanced

mathematics courses. The authors conclude that guidance counseling appears to be an important conduit toward increased coursetaking.

Guidance and encouragement from school staff may also influence coursetaking indirectly through their influence on the value that students place on mathematics and science. Many students do not understand the importance of taking advanced mathematics and science courses (Leitman et al., 1995; Schneider & Stevenson, 1999). In addition, many students do not understand the sequential nature of mathematics courses (Leitman et al.). It is possible that students may place a higher value on mathematics and science once they learn from guidance counselors and teachers that advanced mathematics and science courses are necessary for certain college majors and for certain occupations. Counselors and teachers who encourage students to take more challenging mathematics and science courses are likely to talk to students about why it is important to take these courses (Fallon, 1997; Shoffner & Vacc, 1999). This relationship would be consistent with the expectancy-value model, part of which proposes that students are more likely to take courses that they believe have positive long-range (e.g., "will help me get into the college major I want") and immediate (e.g., "I can get a good grade in this class") consequences (Eccles et al., 1983). Research has consistently shown that the value that students place on math or the level of usefulness they attribute to taking mathematics courses is related to students' taking nonrequired mathematics courses (Eccles et al.; Eccles & Wigfield, 1995; Lantz & Smith, 1981; Updegraff, Eccles, Barber, & O'Brien, 1996). For example, Eccles et al. found that students' intention to take more mathematics courses was directly influenced by their perceptions of the value of mathematics. Updegraff et al. found that 10th grade students' perceptions of the utility of mathematics (the importance of mathematics in general and the importance of mathematics for students' occupations post–high school graduation) predicted the number of mathematics courses that they took throughout high school.

Further research on the MSW initiative could explore the impact of school practices on the value that students place on mathematics and science, to see if the relationship between school practices and coursetaking is mediated by student values. The current study also shows that future research should try to capture more information (such as content and formality) about students' discussions with school staff regarding the students' school programs in order to better understand the relationship between those discussions and coursetaking.

Conclusion (High School and Middle Grades)

The purpose of this paper was to examine the relationship between guidance and advisement from school staff with the academic choices that students make. The analyses included both middle grades and high school students. Although there are differences in the nature of the choices that middle grades and high school students make, the outcomes we studied for both groups represent student behavior that is linked to successful academic careers.

In the middle grades, teacher encouragement to do well and teacher assistance with planning a high school program were significant predictors of positive student behavior. In high school, encouragement from school staff to take challenging courses and assistance from guidance counselors in planning a high school program were significant predictors of positive student behavior. These findings support the hypothesis that guidance and advisement are related to positive academic choices made by both middle grades and high school students.

Although there were differences between middle grades and high school in the effects of planning one's high school program with teachers versus guidance counselors (the amount of guidance from teachers was a significant predictor in the middle grades analyses, but not in the high school analyses, whereas the reverse was true for the amount of guidance from a guidance counselor), this study cannot address the specific reasons for those differences. This is partially due to the fact that the strongest predictor of student course-taking—encouragement from school staff—only asks about teachers in the middle grades, and does not differentiate between teachers and guidance counselors in high school, and this variable is highly correlated with the other predictors. Further research should explore this issue. This study addresses the more general question of the total effect of encouragement and advisement from school staff.

The MSW and MMGW initiatives recommend the key practice of guidance as a tool for improving student achievement. Guidance involves the communication of high expectations through goal-setting and planning and encouragement from school staff to do well in school. The analyses in this report provide models of how guidance from school staff positively influence choices that students make that influence their educational outcomes.

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Appendix A

Zero-Order Correlations Between All Middle Grade Variables[a]

	1	2	3	4	5	6	7	8	9	10	11
1. Gender		−.00	−.07**	.24**	.13**	−.04*	.06**	.04**	.07**	.17**	.14**
2. Ethnicity	−.00		−.03	.27**	−.08**	.04*	−.08**	−.06**	.01	−.10**	.06**
3. Mother's Education Level	−.07**	−.03		.17**	.11**	.07**	.01	.02	−.02	.03	.10**
4. Reading Ability	.24**	.28**	.17**		.12**	.11**	.06**	.01	.14**	.13**	.27**
5. Guidance from Mother	.13**	−.09**	.11**	.12**		.41**	.25**	.14**	.13**	.23**	.16**
6. Guidance from Father	−.04*	.04*	.07**	.10**	.41**		.18**	.12**	.11**	.13**	.14**
7. Guidance from Teachers	.06**	−.09**	.01	.06**	.25**	.18**		.30**	.18**	.18**	.13**
8. Guidance from Guidance Counselors	.04**	−.06**	.02	.01	.13**	.12**	.30**		.04**	.06**	.03
9. Encouragement from School Staff	.07**	.00	−.02	.14**	.13**	.11**	.18**	.05**		.22**	.12**
10. Student Effort	.17**	−.10**	.03	.13**	.23**	.13**	.18**	.05**	.22**		.36**
11. Student Achievement-Related Decisions	.15**	.06**	.10**	.27**	.17**	.14**	.13**	.03	.12**	.36**	

Correlations for Model 1 (n = 4,088) are above the diagonal; correlations for Model 2 (n = 4,080) are below the diagonal.
* $p < .05$, ** $p < .001$, *** $p < .001$

Zero-Order Correlations Between All High School Variables[a]

	2	3	4	5	6	7	8	9	10	11
1. Gender	−.06	−.08*	−.03	.04	.17***	.02	.03	.10**	.01	.10***
2. Ethnicity		−.07*	.00	.11***	.03.	.17***	−.01	−.01	.06	.06
3. Parental Education Level	−.06		.14***	.01	.12***	.09**	.09**	.07*	.12***	.25***
4. Took Algebra in Middle Grades	.00	.14***		.05	.04	.09**	.04	.06	.08**	.29***
5. Graduation Requirements	−.06	.03	.10**		−.02	.03	−.01	.10**	.05	.22***
6. Guidance from Mother	.03	.12***	.04	.02		.47***	.24***	.27***	.15***	.13***
7. Guidance from Father	.17***	.09**	.09**	.02	.47***		.24***	.27***	.11***	.15***
8. Guidance from Teachers	−.01	.09**	.04	−.04	.24***	.24***		.39***	.27***	.15***
9. Guidance from Guidance Counselors	−.02	.08*	.06	.03	.27***	.27***	.39***		.29***	.23***
10. Encouragement from School Staff	.01	.14***	.08*	.04	.16***	.13***	.30***	.31***		.29***
11. # of College-Preparatory Courses	.01	.17***	.23***	.30***	.12***	.09**	.11***	.16***	.24***	

[a] Mathematics correlations are above the diagonal ($n = 879$); science correlations are below the diagonal ($n = 876$).
* $p < .05$, ** $p < .001$, *** $p < .001$

Appendix B

Standardized Regression Coefficients for the Effect of Encouragement and Guidance from School Staff on the Number of College-Preparatory Mathematics Courses Taken, Without the Encouragement Variable

Independent variables	Model 1—Mathematics		Model 2—Science	
	Standardized path coefficients of final model	Total R^2	Standardized path coefficients of final model	Total R^2
Block 1: Control Variables		.20***		.17***
Parent education	.20 (.30)***		.12 (.17)***	
Took algebra 1 in middle grades (0 = no, 1 = yes)	.23 (.71)***		.16 (.47)***	
Female (0 = no, 1 = yes)	.11 (.35)***		.09 (.26)**	
White (0 = no, 1 = yes)	.05 (.19)†		.05 (.15)	
Amount of guidance from mother	.00 (.00)		.03 (.07)	
Amount of guidance from father	.04 (.09)		−.01 (−.02)	
Number of mathematics (science) courses required for graduation	.18 (.73)***		.27 (.69)***	
Block 2: School Characteristics		.22***		.18***
Amount of guidance from teachers	.05 (.13)		.06 (.13)†	
Amount of guidance from guidance counselors	.14 (.33)***		.10 (.21)**	

Mathematics: $n = 879$, Science: $n = 876$.
Unstandardized coefficients in parentheses.
† $p < .10$, ** $p < .01$, *** $p < .001$.

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